






# Alessandro Casa

## CONTACT INFORMATION

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## RESEARCH INTERESTS

Latent variable models; Nonparametric statistics; Clustering; Computational statistics; Density estimation; Dimensionality reduction techniques; Graphical models; Chemometrics; Bayesian statistics.

## CURRENT POSITION

**Assistant Professor of Statistics** since Jan. 2022  
Faculty of Economics and Management, Free University of Bozen-Bolzano  
Ricercatore SECS-S/01, Legge 240/10 tipo A

## PAST POSITIONS

**Postdoctoral research fellow** Mar. 2020 - Dec 2021  
School of Mathematics and Statistics, University College Dublin  
Affiliated with: Vistamilk SFI Research Centre  
Insight SFI Research Centre for Data Analytics  
Supervisor: Prof. T.B. Murphy  
**Research Assistant Pending Viva** Nov. 2019 - Feb. 2020  
School of Mathematics and Statistics, University College Dublin  
Affiliated with: Vistamilk SFI Research Centre  
Insight SFI Research Centre for Data Analytics

## EDUCATION

**Ph.D. in Statistics** Oct. 2016 - Feb. 2020  
University of Padova  
Thesis: *Climbing modes and exploring mixtures: a journey in density-based clustering*  
Supervisor: Prof. G. Menardi and Prof. J.E.Chacòn (co-supervisor)  
**Master degree in Statistical Sciences** Oct. 2014 - Sept. 2016  
University of Padova  
Final grade: 110/110 cum laude  
Thesis: *Semi-supervised detection of collective anomalies using non-parametric methods with an application to particle physics* (written in italian)  
Supervisor: Prof. G. Menardi  
**Bachelor degree in Statistics, Economics and Finance** Oct. 2011 - July 2014  
University of Padova  
Final grade: 110/110 cum laude  
Thesis: *Dimension reduction for model-based clustering: a simulation study and an application to genetic data* (written in italian)  
Supervisor: Prof. G. Menardi

## VISITING PERIODS

**During the Ph.D. program**  

- University of Cote d'Azur, Laboratory J.A. Dieudonné. Visiting scholar under the supervision of Prof. C. Bouveyron (Oct. 2018 - Dec. 2018)
- University of Perugia, Department of Economics. Visiting scholar under the supervision of Prof. L. Scrucca (Apr. 2018)
- University of Cambridge, Department of Pure mathematics and Mathematical Sciences. Visiting scholar under the supervision of Prof. R. Samworth (Oct. 2017 - Dec. 2017)

**CONFERENCES  
PRESENTATIONS**

**Seminars**

- Trinity College Statistics Seminar series. Online (Feb. 2022)
- UCD Working Group on Statistical Learning. Online (Feb. 2021)
- Vistamilk Spectroscopy Research Meeting. Online (Jul. 2020)
- UCD Working Group on Statistical Learning. Dublin (Feb. 2020)

**Invited talk**

- CMStatistics 2021 - 14th ERCIM WG. Online (Dec. 2021)
- Vistamilk Annual Conference. Online (Mar. 2021)
- Vistamilk SFI Site Review. Online (Oct. 2020)
- CLADAG - Classification and Data Analysis Group. Cassino (Sept. 2019)
- EMS - European Meeting of Statisticians. Palermo (Jul. 2019)

**Contributed talk and Poster presentations**

- WG21 - Working Group on Model-Based Clustering. Athens (Oct. 2021)
- CLADAG - Classification and Data Analysis Group. Online (Sept. 2021)
- SIS - 50th Scientific meeting of the Italian Statistical Society. Online (Jun. 2021)
- CASI - 41st Conference on Applied Statistics in Ireland. Online (May 2021)
- WG19 - Working Group on Model-Based Clustering. Wien (Jul. 2019)
- ASPD - Workshop on Advanced Statistics for Physics Discovery. Padova (Sept. 2018)
- MBC2 - Model-Based Clustering and Classification. Catania (Sept. 2018)
- ECDA - European Conference on Data Analysis. Paderborn (Jul. 2018)
- SIS - 49th Scientific meeting of the Italian Statistical Society. Palermo (Jun. 2018)
- ISNPS - 4th Conference of the International Society for Nonparametric Statistics. Salerno (Jun. 2018)
- SIS - Intermediate conference of the Italian Statistical Society. Florence (Jun. 2017)

**TEACHING AND  
SUPERVISION**

**Teaching Experience**

**Free university of Bozen-Bolzano**

- Statistical Methods for Business Analysis - Lecturer  
Master Degree in Entrepreneurship and Innovation, Academic year 2021/2022

**University College Dublin**

- STAT20060 - Statistics & Probability - Lecturer  
Level 2, Academic year 2019/2020.
- STAT30270 - Statistical Machine Learning - Teaching assistant  
Level 3, Academic year 2019/2020.
- STAT20060 Statistics & Probability - Teaching assistant  
Level 2, Academic year 2019/2020.

**University of Padova**

- *Bike sharing in Paris: a case study* (in italian).  
Specialist lecture during the class Statistica Iterazione  
Master degree, Academic year 2018/19.

**Supervising Experience**

- Academic Tutor: Isabel Franchini, curricular internship (Free University of Bozen-Bolzano, a.y. 2021-2022)
- MSc Thesis co-supervision: Giulia Pascali (University of Padova, a.y. 2018/19, supervisor: Giovanna Menardi)

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## SERVICE

### Research projects

- “High-dimensional data analysis for environmentally sustainable decision-making”, PON (MUR). PI: Prof. Davide Ferrari  
Position: Member of the research group
- Vistamilk - Research grant from Science Foundation Ireland and the Department of Agriculture, Food and Marine on behalf of the Government of Ireland (grant 16/RC/3835).  
Position: External academic collaborator  
January 2022 – today
- Vistamilk - Research grant from Science Foundation Ireland and the Department of Agriculture, Food and Marine on behalf of the Government of Ireland (grant 16/RC/3835).  
Position: Member of the research group  
November 2019 – December 2021

### Referee for

- Annals of Applied Statistics, Canadian Journal of Statistics, Computational Statistics and Data Analysis, Electronic Journal of Statistics, Food Analytical Methods, Journal of Computational and Graphical Statistics, Journal of Dairy Science, Knowledge-based Systems, Mathematics, New England Journal of Statistics in Data Science, Scientific Reports, Social Indicators Research, Stat, Statistical Analysis and Data Mining, Statistics and Computing, WIREs Computational Statistics.

### Organization of Scientific Events

- Member of the organising committee of the second edition of the *International Workshop on Spectroscopy and Chemometrics* (Dublin, April 2022)
- Academic Lead of the organizing committee of the inaugural edition of the *International Workshop on Spectroscopy and Chemometrics* (Online, April 2021)
- Member of the organising committee of the monthly Vistamilk Spectroscopy research meetings (July 2020 - now)

### Membership

- Irish Statistical Association (ISA)
- Società Italiana di Statistica (SIS)

### Service to university

- Member of the selection committee regarding evaluation and ranking of the applications concerning Teaching contract, Lecturing assistant and Teaching assistant positions. Free University of Bozen-Bolzano (Jan 2022 – Today)
- Elected representative of Ph.D. students and Postdoctoral researchers in the Faculty Board. University of Padova (2016–2020)
- Elected representative of Ph.D. students in the Doctoral Board of the Grad School. University of Padova (2016-2019)

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## EVENTS

- Start Up Research - Follow up Jun. 2018  
Follow up meeting where the research groups present and discuss the scientific output of their works after one year of research
- Start Up research Jun. 2017  
Meeting where small research groups of young scholars, advised by senior researchers, are asked to develop innovative methods and models to analyze a common dataset

- Stats Under the Stars 3 Jun. 2017  
Organizers: University of Florence, Italian Statistical Society
- Stats Under the Stars 1 Sept. 2015  
Organizers: University of Padova, Italian Statistical Society
- Data Science Game Jun. 2015  
Organizers: Google, Capgemini

## COMPUTER SKILLS

**OS and Applications:** Mac OS, Microsoft Windows, Linux, OpenOffice  
**Programming languages:** R (advanced), Python, SQL, Stata, SAS, C/C++  
**Markup:** L<sup>A</sup>T<sub>E</sub>X, HTML, Markdown

## PUBLICATIONS

### Working papers

- Huang, Z., **Casa, A.** & Ferrari, D.  
*Efficient estimation of sparse high-dimensional covariance matrices by pairwise likelihood truncation*
- **Casa, A.**, Z. Huang & Ferrari, D.  
*Fast and efficient spatial covariance estimation in large datasets by composite likelihood truncation*
- Ferraccioli, F., **Casa, A.** & Stefanucci, M.  
*Adaptive functional regression for spectroscopy data*
- Cappozzo, A., **Casa, A.** & Fop, M.  
*Variable selection for matrix-variate model-based clustering via penalized estimation*
- **Casa, A.**, Murphy, T.B. & Fop, M.  
*Penalized partial membership models for food authentication and detection of adulterated regions*

### Submitted preprints

- **Casa, A.**, Cappozzo, A. & Fop, M. (2021+)  
*Group-wise shrinkage estimation in penalized model-based clustering*  
Preprint available at: <https://arxiv.org/pdf/2105.07935.pdf>

### Articles in refereed journals

- **Casa, A.**, O'Callaghan, T.F. & Murphy, T.B. (2021+)  
*Parsimonious Bayesian Factor Analysis for modelling latent structure in spectroscopy data.*  
Annals of Applied Statistics (in press)  
Preprint available at: <https://arxiv.org/pdf/2101.12499.pdf>
- Frizzarin, M., Gormley, I.C., **Casa, A.** & McParland, S. (2021)  
*Selecting milk spectra to develop equations to predict milk technological traits*  
Foods, 10(12), 3084
- Stakia, A., Dorigo, T., Banelli, G., Bortoletto, D., **Casa, A.**, de Castro, P., Delaere, C., Donini, J., Finos, L., Gallinaro, M., Giammanco, A., Held, A., Jimenez Morales, F., Kotkowski, G., Liew, S.P., Maltoni, F., Menardi, G., Papavergou, I., Saggio, A., Scarpa, B., Strong, G.C., Tosciri, C., Varela, J., Vischia, P. & Weiler, A. (2021)  
*Advanced multi-variate analysis methods for new physics searches at the Large Hadron Collider*  
Accepted for publication in Reviews in Physics  
Preprint available at: <https://arxiv.org/pdf/2105.07530.pdf>
- Frizzarin, M., Bevilacqua, A., Dhariyal, B., Domijan, K., Ferraccioli, F., Hayes, E., Ifrim, G., Konkolewska, A., Le Nguyen, T., Mbaka, U., Ranzato, G., Singh, A., Stefanucci, M. & **Casa, A.** (2021).

*Mid infrared spectroscopy and milk quality traits: a data analysis competition at the “International Workshop on Spectroscopy and Chemometrics 2021”*  
Chemometrics and Intelligent Laboratory Systems, 219, 10442

- **Casa, A.**, Bouveyron, C., Erosheva, E. & Menardi, G. (2021)  
*Co-clustering of time-dependent data via the Shape Invariant Model*  
Journal of Classification, 38, 626-649
- Frizzarin, M., O’Callaghan, T.F., Murphy, T.B., Hennessy, D. & **Casa, A.** (2021)  
*Application of machine learning methods to milk mid infrared spectra for discrimination of cows milk from pasture or TMR diets*  
Journal of Dairy Science, 104(12), 12394-12402
- **Casa, A.** & Menardi, G. (2021)  
*Nonparametric semi-supervised classification with application to signal detection in high energy physics.*  
Statistical Methods & Applications  
<https://doi.org/10.1007/s10260-021-00585-3>
- Frizzarin, M., Gormley, I.C., Berry, D.P., Murphy, T.B., **Casa, A.**, Lynch, A. & McParland, S. (2021)  
*Predicting dairy cow milk quality traits from routinely available milk spectra using statistical machine learning methods.*  
Journal of Dairy Science 104(7), 7438–7447
- **Casa, A.**, Scrucca, L. & Menardi, G. (2021).  
*Better than the best? Answers via model ensemble in density-based clustering.*  
Advances in Data Analysis and Classification 15, 599-623
- **Casa, A.**, Chacón, J.E. & Menardi, G. (2020)  
*Modal clustering asymptotics with applications to bandwidth selection.*  
Electronic Journal of Statistics 14(1), 835–856
- **Casa, A.** (2018)  
*On the choice of the weight function for the integrated likelihood.*  
SM Journal of Biometrics & Biostatistics, 3(3), 1033

### Discussions

- **Casa, A.**, Fop, M. & Murphy, T.B. (2021)  
*Contributed discussion on: “Centered partition processes; informative priors for clustering” by Paganin, S., Herring, A.H., Olshan, A.F. & Dunson, D.B.*  
Bayesian Analysis 16(1), 301–370

### Book chapters

- Cabassi, A., **Casa, A.**, Farcomeni, A., Fontana, M., Russo, M. (2018).  
*Three testing perspectives on connectome data.*  
Studies in Neural Data Science, Springer Volume ‘Proceedings in Mathematics & Statistics’, ISBN-9783030000394.

### Refereed conference proceedings

- **Casa, A.**, Bouveyron, C., Erosheva, E. & Menardi, G. (2021)  
*Model-based co-clustering of multivariate time-dependent data*  
Book of Abstract, CFE-CMStatistics 2021, ISBN 978-9925-7812-5-6
- Cappozzo, A., **Casa, A.** & Fop, M. (2021)  
*Model-based clustering with sparse matrix mixture models.*  
CLADAG 2021 - Book of abstract and short papers.  
DOI: 10.36253/978-88-5518-340-6
- Cappozzo, A., **Casa, A.** & Fop, M. (2021)  
*Penalized model-based clustering for three-way data structures.*  
Book of short papers - SIS 2021. ISBN 9788891927361

- **Casa, A., O'Callaghan, T.F. & Murphy, T.B. (2021)**  
*Parsimonious modelling of spectroscopy data via a Bayesian latent variables approach.*  
Book of short papers - SIS 2021. ISBN 9788891927361
- **Casa, A., Chacòn, J.E. & Menardi, G. (2019)**  
*Asymptotics for bandwidth selection in nonparametric clustering.*  
Cladag 2019 - Book of short papers. ISBN 9788883171086
- **Casa, A. & Menardi, G. (2019)**  
*Nonparametric semisupervised classification and variable selection for new physics searches.*  
EMS 2019 - Program and Book of Abstracts.
- **Pascali, G., Casa, A. & Menardi, G. (2019)**  
*Co-clustering TripAdvisor data for personalized recommendations.*  
Book of short Papers SIS 2019. ISBN 978889191510.
- **Casa, A., Scrucca, L. & Menardi, G. (2018)**  
*Averaging via stacking in model-based clustering.*  
Book of abstracts of the 4th International Workshop on Model-Based Clustering and Classification (MBC2)
- **Casa, A., Scrucca, L. & Menardi, G. (2018)**  
*On the selection uncertainty in parametric clustering.*  
Book of abstracts of the European Conference on Data Analysis (ECDA)
- **Casa, A., Chacòn, J.E. & Menardi, G. (2018)**  
*On the choice of an appropriate bandwidth for modal clustering.*  
Book of short Papers SIS 2018. ISBN 9788891910233
- **Casa, A., Chacòn, J.E. & Menardi, G. (2018)**  
*Clustering-oriented selection of the amount of smoothing in kernel density estimation.*  
Book of abstracts - ISNPS 2018. ISBN 9788861970 007
- **Casa, A. & Menardi, G. (2017)**  
*Signal detection in high energy physics via a semisupervised nonparametric approach.*  
Proceedings of the Conference of the Italian Statistical Society "Statistics and Data Sciences: new challenges, new generations". ISBN 9788864535210
- **Casa, A. & Menardi, G. (2017)**  
*Nonparametric semi-supervised classification with application to signal detection in high energy physics.*  
Books of abstracts of the International Federation of Classification Societies (IFCS)